geometric center being coincident with the magnetic center along at least the first axis of the core.

2. The miniature resonating marker assembly of claim 1 wherein the core is a material with a relative permeability greater than 1.0.

3. The miniature resonating marker assembly of claim 1 wherein the core is a ferromagnetic core.

4. The miniature resonating marker assembly of claim 1 wherein the core has a rod portion positioned within the coil and a pair of enlarged ferromagnetic endcaps connected to the rod portion, the endcaps having a relative permeability greater than 1, the coil being disposed between the endcaps.

a1 cont.

5. The miniature resonating marker assembly of claim 4 wherein the endcaps are made of a ferromagnetic material.

6. The miniature resonating marker assembly of claim 4 wherein the endcaps each have an arcuate outer surface facing away from the rod portion.

7. The miniature resonating marker assembly of claim 1 wherein the core has a rod portion positioned within the coil and a pair of enlarged endcaps connected to the rod, the coil being disposed between the endcaps, one of the endcaps having a volume of material greater than the volume of material of the other endcap.

8. The miniature resonating marker assembly of claim 1 wherein the enlarged ferromagnetic core extends through the coil and has a first end portion exterior of one end of the coil and a second end portion exterior of another end of the coil, the first end portion exterior of the coil having a volume greater than the volume of the second end portion so the magnetic center is spaced apart from a center point of the coil.

9. The miniature resonating marker assembly of claim 1 wherein the core has a rod portion positioned in the coil, a first endcap connected to one end portion of the rod portion, and a second endcap connected to another end portion of the rod, the first endcap being larger than the second endcap.

10. (Amended) The miniature resonating marker assembly of claim 1 wherein the core has a rod portion positioned in the coil, a first endcap connected to an end portion of the rod portion, and a second endcap connected to another end portion of the rod portion, the first endcap being axially adjustable over the rod portion and relative to the coil. tuning

11. The miniature resonating marker assembly of claim 10 wherein second endcap is fixed relative to the rod portion.

cut

12. (Amended) The miniature resonating marker assembly of claim 1 wherein the geometric center is coincident with the magnetic center along three axes of the unit.

a1 cont.

13. (Amended) The miniature resonating marker assembly of claim 1, further comprising a sleeve positioned between the wire coil and the core, the wire coil being wound onto the sleeve, and the sleeve and coil being positioned over the core.

14. The miniature resonating marker assembly of claim 13 wherein the core is disposed within the sleeve and axially movable relative to the coil to achieve a selected resonant frequency of the assembly.

15. (Amended) The miniature resonating marker assembly of claim 1, further comprising a ferromagnetic adhesive securely retaining the coil on the core.

16. The miniature resonating marker assembly of claim 1 wherein the wire coil includes a plurality of windings of a wire, the wire having a bonding coating thereon to adhere the wire of one wind to the wire of an adjacent wind.

17. (Amended) The miniature resonating marker assembly of claim 1 wherein the unit is attached to an anchoring member extending from one end of the unit, and the anchoring member is shaped to anchor the unit to tissue in or on a patient.

18. The miniature resonating marker assembly of claim 1 wherein the assembly has an axial length of approximately 14 mm or less.

19. (Amended) A miniature resonating marker assembly having a geometric center, comprising:

Fig. 18

a core having an elongated central portion, a first cap having a first thickness, and a second cap having a second thickness, wherein the first thickness is different than the second thickness;

a wire coil disposed around the central portion of the core between the first and second caps; and

a capacitor connected to the wire coil operative to form a signal element that generates a magnetic field with a selected resonant frequency in response to a specific stimulus.

a1 cont.

20. (Amended) A resonating marker assembly having a geometric center, comprising:

Fig. 18

a ferromagnetic core having an elongated central portion and first and second ferromagnetic endcaps at opposite ends of the central portion, the core being substantially symmetrical about a longitudinal axis of the core, and being asymmetrical about a lateral axis of the core;

a wire coil disposed around the central portion of the ferromagnetic core intermediate the first and second endcaps; and

a capacitor connected to the wire coil forming a signal element that generates a magnetic field with a selected resonant frequency in response to a specific stimulus, the magnetic field having a magnetic center along a first

axis coincident with the geometric center of the resonating marker assembly.

21. (Amended) A resonating marker assembly having a geometric center, comprising:

Figs 4,4

a core having an elongated central portion and first and second endcaps connected to the central portion;

a wire coil disposed around the central portion of core intermediate the first and second endcaps; and

a capacitor connected to the wire coil to form a tuned signal element that generates a magnetic field with a selected resonant frequency in response to a specific stimulus, the first endcap being movable relative to the coil and capacitor for tuning the marker assembly to a selected resonant frequency.

22. (Amended) A resonating marker assembly, comprising:

a1 cont. Figs. 6,7

a sleeve;

a core having a central portion extending through the sleeve and a pair of endcaps connected to the central portion, the sleeve being between the endcaps, and the core being axially movable relative to the sleeve;

a wire coil disposed around the sleeve; and

a capacitor connected to the wire coil proximate to the core to form a signal element that generates a magnetic field with a selected resonant frequency in response to a specific stimulus, the core being axially movable relative to the sleeve and the coil for tuning the marker assembly to a selected resonant frequency.

23. (Amended) A tunable, resonating marker assembly, comprising:

Fig 8

a wire coil defining an interior area;

a capacitor connected to the wire coil to form an electrical circuit; and

a ferromagnetic core having first and second segments each extending at least partially into the interior area of the coil, the first and second segments being axially movable relative to each other and to the coil for tuning the marker assembly to a selected resonant frequency.

Sub C1 7 24. (Amended) A resonating marker assembly, comprising:

a ferromagnetic core having a first end and a second end;

a wire coil disposed around the ferromagnetic core;

a capacitor positioned at the first end of the core and operatively connected to the wire coil to form a signal element that generates a magnetic field with a selected resonant frequency in response to a specific stimulus; and

? a segment at the second end of the core that projects outwardly with respect to the longitudinal axis of the core.

25. (Amended) A resonating marker assembly, comprising:

A1 cont.

a core;

a wire coil disposed around the core;

a capacitor operatively connected to the wire coil to form a signal element that generates a magnetic field with a selected resonant frequency in response to a specific stimulus; and

an inert encapsulation member encapsulating the core, the wire coil, and the capacitor forming an activatable unit implantable in a patient through an introducer needle.

Fig. 14 26. A resonating marker assembly, comprising;

a capacitor having an aperture therethrough;

an elongated ferromagnetic core extending through the aperture in the capacitor;

a wire coil connected to the capacitor, the wire coil having a first portion disposed around the core adjacent to one side of the capacitor, and a second portion disposed around the core adjacent to another side of the capacitor; and

an inert encapsulation member encapsulating the capacitor, the core, and the coil.

27. A resonating marker assembly, comprising:

Figs. 15-17

an elongated core having an I-shaped cross-sectional area defined by a central web portion intermediate a pair of flange portions connected to the central web portion;

a wire coil disposed around the central web portion between the flange portions of the core;

a capacitor connected to the wire coil adjacent to the core to form a signal element that generates a magnetic field with a selected resonant frequency in response to a specific stimulus; and

an inert encapsulation member encapsulating the signal element forming an inert implantable, activatable marker assembly.

a1 cont.

28. (Amended) A method of actively tuning a resonating marker assembly to have a selected resonant frequency value, comprising:

Fig. 19

winding an elongated wire around a central portion of a ferromagnetic core intermediate a pair of ferromagnetic endcaps of the core to form a coil with a plurality of windings, the coil and core forming a combination with a first inductance value;

measuring the first inductance value of the combination;

comparing the measured first inductance value to a reference inductance value; and

adjusting the amount of wire forming the coil after comparing the measured first inductance value to the reference inductance value by adding or removing one or more turns from the coil until an inductance value of the combination is substantially equal to the reference inductance value.

29. (Amended) A method of tuning a miniature resonating marker assembly to a selected resonant frequency, comprising:

Fig. 9

placing a ferromagnetic core within a wire coil having a plurality of windings to form an inductor;

connecting lead wires of the inductor to a capacitor, the capacitor being proximate to the core to form a miniature signal element;

exciting the marker assembly at a known frequency;

measuring a marker signal intensity or a signal phase at a frequency of interest; and

adjusting the core axially relative to the windings to adjust an actual inductance until a resonant frequency of the marker matches the selected resonant frequency.

30. (Amended) A method of tuning a miniature resonating marker assembly to a selected resonant frequency where the impedance of an inductor and a capacitor are matched at the selected resonant frequency, comprising:

a1 cont.

Fig. 8

placing a core within a wire coil having a plurality of windings to form an inductor;

connecting lead wires of the inductor to a capacitor with a known capacitance, the capacitor being proximate to the core to form a miniature signal element;

measuring an actual resonant frequency of the signal element; and

adjusting the core axially relative to the wire coil until the actual resonant frequency is within a desired range of the selected resonant frequency.

31. The method of claim 30, further comprising fixing the core to the winding to prevent axial movement therebetween after the actual resonant frequency is substantially equal to the selected resonant frequency.

32. (Amended) The method of claim 30, further comprising winding the coil onto a sleeve with an interior area, and wherein placing the core within the wire coil includes placing the core within the interior area of the sleeve.

33. The method of claim 30, further comprising encapsulating the core, the coil, and the capacitor in an inert encapsulation member, and sealing the encapsulation member to hermetically contain the tuned marker assembly.

34. (Amended) The method of claim 30 further comprising providing the core with a pair of endcaps, and wherein the adjusting step comprises adjusting the core axially by moving one of the endcaps relative to the coil along an axis of the core.

35. (Amended) The method of claim 34, further comprising securing the endcap on the central portion in a fixed location after the resonant frequency is substantially equal to the selected resonant frequency.

A1 cont.

36. The method of claim 30, further comprising forming the wire coil from a plurality of turns of a wire with an airbondable coating thereon to adhere each turn to one or more adjacent turns forming a self supporting winding.

37. The method of claim 30, further comprising securing the core in a fixed position relative to the winding with a ferromagnetic-based adhesive when the actual resonant frequency is substantially equal to the selected resonant frequency.

38. (Amended) A method of making a tuned, miniature resonating marker assembly with a selected inductance, a known capacitance, and a selected resonant frequency comprising:

placing a wire coil around a ferromagnetic core having a central portion within the coil and a pair of ferromagnetic endcaps attached to the central portion adjacent to the coil;

connecting a capacitor to lead wires of the wire coil, the capacitor having a known capacitance and being proximate to the core and the coil to form an activatable assembly;

measuring an actual resonant frequency of the activatable assembly;

Fig. 4,5

comparing the actual resonant frequency to the selected resonant frequency; and

removing ferromagnetic material from the core to adjust the actual resonant frequency of the activatable assembly until the actual resonant frequency is substantially equal to the selected resonant frequency.

39. (Amended) A method of tuning a miniature resonating marker assembly to a selected resonant frequency, comprising:

placing a ferromagnetic core within a wire coil having a plurality of windings to form an inductor;

Fig. 4,5

connecting lead wires of the inductor to a capacitor, the capacitor being proximate to the core to form a miniature signal element;

exciting the marker assembly at a known frequency; and

removing ferromagnetic material from the core to adjust an actual inductance of the activatable assembly until an actual resonant frequency of the marker matches the selected resonant frequency.